

## 6. Color

- a. The colors of gases and liquids are due to \_\_\_\_\_.
- b. When violet color is absorbed, the color transmitted is \_\_\_\_\_.
- c. The range of wavelengths for visible light is \_\_\_\_\_.

**SELF-TEST****A. Multiple choice:**

1. Which one of the following could be described as a chemical property?
  - a. The crystal is rhombic in shape.
  - b. The density is  $2.593 \text{ g/cm}^3$ .
  - c. The solubility is  $43 \text{ g/100 g H}_2\text{O}$  at  $45^\circ\text{C}$ .
  - d. The compound reacts violently with water.
2. A compound X has a solubility of  $79 \text{ g/100 g H}_2\text{O}$ . When  $24 \text{ g}$  of X are added to  $68 \text{ g}$  of water, the resulting mixture is
  - a. a homogeneous solution.
  - b. a heterogeneous mixture.
  - c. a compound.
  - d. an element.
3. Chicken noodle soup is
  - a. a heterogeneous mixture.
  - b. an element.
  - c. a homogeneous solution.
  - d. a pure compound.
4. The grocer sells you 2 dozen eggs. He tells you that he will give you 25 eggs for the price of 2 dozen. The number of significant figures in 25 is
  - a. 1
  - b. 2
  - c. ambiguous
  - d. infinite
5. The solubility of compound Y is plotted against temperature. A straight line with a negative slope is obtained. This means that
  - a. the solubility of Y increases with increasing temperature.
  - b. the solubility of Y decreases with increasing temperature.
  - c. the solubility of Y is independent of temperature.
  - d. all of the above are true.

B. Answer the questions below, using **LT** (for *is less than*), **GT** (for *is greater than*), **EQ** (for *is equal to*), or **MI** (for *more information required*) in the blanks provided.

- \_\_\_\_\_ 1. Consider two compounds A and B of equal mass. The density of A is larger than the density of B. The volume of A (1) the volume of B.
- \_\_\_\_\_ 2. The number of significant figures for x in the following calculation is (2) 2.  
$$\frac{(2.68)(1.9) - (0.4)(0.01396)}{0.7143}$$
- \_\_\_\_\_ 3. A compound Z has a solubility of 39 g/100 g H<sub>2</sub>O at 45°C. Its solubility at 90°C is (3) 39 g/100 g H<sub>2</sub>O.
- \_\_\_\_\_ 4. The temperature of lukewarm water is about 52°C. If a thermometer calibrated to a tenth of a degree is used to measure the temperature of the water, the number of significant figures in the measurement is (4) 3.
- \_\_\_\_\_ 5. A cork pellet is dropped into water and floats. The density of the cork pellet is (5) 1.
- \_\_\_\_\_ 6. 0.00123 mg (6) 1.23 g.

C. Problems:

Consider bromine with the following properties:

density: 3.12 g/cm<sup>3</sup>

melting point: -7°C

boiling point: 59°C

solubility: 3.3 g/100 g water at 25°C, 1 atm

color: red

1. How many pounds of bromine would fill 1.68 qt?

2. A student tries to determine the density of a pebble by bromine displacement. She obtained the following data:

mass of flask filled with bromine	76.83 g
mass of flask filled with bromine + pebble	89.68 g
mass of pebble	23.45 g

What is the density of the pebble?

3. At 25°C, how many milliliters of bromine could you dissolve in 1.000 L of water? (Assume the density of water is 1.00 g/cm<sup>3</sup>.)

4. If we use the melting and boiling points of bromine for a new temperature unit, say, °B, where the melting point of bromine is 0°B and its boiling point is 100°B, derive the mathematical formula for converting °B to °C.

**ANSWERS****Exercises:**

- |  |                   |                               |                    |
|--|-------------------|-------------------------------|--------------------|
| (E1) $-215^{\circ}\text{F}$ , 136 K    | (E2) 6            | (E3) 5                        | (E4) infinite      |
| (E5) 0.0142                            | (E6) 13.398 g     | (E7) 24.56 g                  | (E8) 0.00689 miles |
| (E9) 1.768 metric tons                 | (E10) 11.2 mg/min | (E11) 69.9 g                  | (E12) 220.2 g      |
| (E13) 37 g sodium chloride/100 g water |                   | (E14) yes; 7 g more; no; 32 g |                    |

**Self-test****A. Multiple Choice:**

- |      |      |      |      |      |
|------|------|------|------|------|
| 1. d | 2. a | 3. a | 4. d | 5. b |
|------|------|------|------|------|

**B. LT, GT, EQ, or MI**

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 1. LT | 2. EQ | 3. MI | 4. GT | 5. LT | 6. LT |
|-------|-------|-------|-------|-------|-------|

**C. Problems**

- |            |              |          |  |
|------------|--------------|----------|--|
| 1. 10.9 lb | 2. 6.92 g/mL | 3. 11 mL | 4. $^{\circ}\text{C} = 0.66^{\circ}\text{B} - 7$ |
|------------|--------------|----------|--|